

of the Colorado Valley," to say nothing of his "Key to North American Birds"—of which a third edition was announced for the ensuing spring—and his "Ornithological Bibliography," each a model of accurate work, proclaim him to have been far in advance of any other contemporary of his own country, or indeed of many others. In the summer of 1884 Dr. Coues visited England, to the great satisfaction of British ornithologists, to most of whom he had been only known by name, for thus his attractive personality attached to him many warm friends. After taking a considerable share in the publication of the "Century Dictionary," of which he was the Natural History editor, he latterly turned his attention to some of the earlier geographical explorations of his own country, and we owe to him admirable editions of the "Travels" of Lewis and Clark, and of General Pike.

Last summer Dr. Coues revisited Arizona, intent on ethnological researches, but found a camp life at the elevation of 7000 feet too much for his powers. Returning to Washington in the autumn, distressing symptoms of a serious ailment soon began to show themselves, and in a touching letter to an English friend, written at the end of November, he announced that the only hope for the prolongation of his life lay in the success of a very formidable surgical operation which he was about to undergo in the Johns Hopkins Hospital at Baltimore. The last mail brought the sad news of its failure, and the ornithologists of Britain will assuredly condole with those of North America in the loss of the most accomplished of their brethren.

A. N.

NOTES.

IN calling attention to the article in another column concerning the future representation of the London University in Parliament, we may state that there is a very widely expressed feeling that such representation, being a matter of national concern, should be considered from an absolutely non-political standpoint. A strong feeling has been expressed in many quarters that if the representative of the University be not a man of European distinction, a great opportunity will have been lost. Among those thought of from this point of view is a distinguished office bearer of the Royal Society. We trust that if he has been asked to serve in such a cause, he will not refuse to come to the assistance of those who are working to promote it.

PROFS. DARBOUTX AND MOISSAN have been nominated to represent the Paris Academy of Sciences at the forthcoming celebration of the second centenary of the Berlin Academy of Sciences.

THE Council of the Royal Astronomical Society have awarded the Society's gold medal for this year to M. Poincaré, for his researches in celestial mechanics.

THE Municipal Council of Paris have adopted a proposal by M. Daix, to light the place de la Concorde with acetylene gas during the forthcoming Exhibition.

THE Geological Society has this year awarded its medals and funds as follows:—The Wollaston medal to Prof. G. K. Gilbert, of Washington; the Murchison medal to Baron A. E. Nordenskiöld, of Stockholm; the Lyell medal to Mr. J. E. Marr, of Cambridge; the Wollaston fund to Mr. G. T. Prior; the Murchison fund to Mr. A. Vaughan Jennings; the Lyell fund to Miss G. L. Elles; and the Barlow-Jameson fund to Mr. G. C. Crick and Prof. T. T. Groom.

THE annual congress and exhibition of the Sanitary Institute will be held at Nottingham about the end of August.

THE annual general meeting of the Institution of Mechanical Engineers will be held on Friday, January 26.

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THE Royal Bavarian Academy of Sciences has conferred upon Herr Eugen Wolf, the explorer, its large gold medal for services rendered to science.

THE St. Petersburg correspondent of the *Times* announces that a special separate department has been created in the Russian Council of State, to be called the "Section of Industry, Science and Trade." Under the head of Science, it is intended that this new department shall help to direct the advance of national education, a subject which, in connection with the economical development of Russia, is now beginning to obtain the powerful support so much needed.

WE learn with regret from Prof. H. H. Giglioli that Mr. John Bernard Stallo, of Cincinnati, U.S.A., died at Florence on January 6, in his seventy-sixth year. Judge Stallo, as he was usually called, was well known as a philosopher, mathematician and physicist; he was, during President Cleveland's first term of office, Ambassador of the United States at Rome. Since then he had lived in Florence amidst his books, taking to the very last a keen interest in the progress of science. Prof. Mack's last book is dedicated to him.

WE learn from *Science* that Prof. E. B. Wilson, of Columbia University, has been elected president of the American Society of Naturalists, in succession to Prof. W. G. Farlow, of Harvard University; and Dr. William McMurtrie, of New York City, has been elected president of the American Chemical Society, in succession to Prof. Edward Morley.

SIR WILLIAM MACCORMAC is contributing to the *Lancet* some valuable notes on the treatment of the wounded at the seat of war, and the wounds produced by modern bullets. He is particularly well qualified to express an opinion on the severity of bullet-wounds, for he had excellent opportunities of observing the lesions resulting from bullets during the Franco-Prussian war, and he states that in most cases the damage done by the modern bullet, especially by the Mauser, cannot be compared in severity with that inflicted by the needle-gun or the Chassepôt. His articles put medical men in the possession of much information not hitherto available, and constitute a real contribution to scientific knowledge.

SEVERAL correspondents have sent descriptions of solar halos and parhelia observed from various parts of Sussex and Surrey on Thursday last, January 11, between 9.30 and 11.30 a.m. Judging from the particulars communicated to us, what was seen was a typical exhibition of this meteorological phenomenon, which is not unfrequent in these latitudes, though it is rarely so well defined as it was on Thursday. The halos consisted of (1) a first bow concentric with the sun, red within, blue or green without, and having an angular radius of 21° or 22° ; (2) a second circle or halo, similar to the first, but at twice the angular distance from the sun; (3) two inverted arches touching the two concentric halos, blue or green on the concave side, and red on the convex; (4) bright patches or mock suns on the same level as the sun, and apparently lying on the halos. The sky, except near the horizon, was cloudless but misty, the sun being faintly visible. This is the usual condition for the formation of halos, which are produced by the reflection and refraction of the sun's rays by the minute ice-crystals which constitute cirro-stratus clouds. A writer from New Shoreham, Sussex, remarks that the mock suns are there called "sun hounds," and in Kent "sun dogs."

FROM a recent issue of the *Times* we learn of a brilliant daylight meteor which was seen by several observers on the afternoon of January 9. Mr. H. H. P. Bouverie, writing from Glynde Place, Lewes, remarks: "Whilst shooting here to-day I saw a brilliant meteor, which started from near the moon, that was

quite bright at the time ; it travelled for a short distance towards the north-east, and left a marvellously luminous path of white light. The time of its appearance was as near 2.55 p.m. as possible. I never heard of such a thing being seen in broad daylight." Another observer writes : "At 2.55, in brilliant sunlight, a remarkable meteor was seen by a party of five from Reigate Heath Golf Ground. The course of the meteor was south to north, and it traversed a considerable portion of the heavens. In appearance it resembled a kite with a tail of a luminous white colour. It was visible for about a second." From the Drive, Brighton, the Rev. R. Hudson writes with respect to the same meteor : "The colour was brilliant white, like an incandescent gas-light. There was a nucleus and tail of considerable length. The altitude was about half that of the moon, which was visible at the same time. The sky was cloudless and blue, and the sun was shining brightly. The general effect was that of the falling stick of a rocket, and, indeed, my first impression was that it was a peculiar daylight rocket, but a moment's consideration of the direction of flight convinced me that it was a very remarkable meteor."

THE *Scientific American* states that the American Museum of Natural History has acquired, through the generosity of President Jesup, the second half of the Cope collection of fishes, amphibians and reptiles brought from Kansas, Colorado, Wyoming, Montana and other sections of the West between the years 1867 and 1896. In 1895 the first part of this collection was presented to the Museum by the trustees, so that now the entire life work of the late Prof. Cope will be permanently represented there. The proceeds of the sale of the collection will form an endowment fund for a professorship of natural science in Philadelphia.

ALL the vertebrate collections of the late Prof. O. C. Marsh, belonging to the U.S. Government have been transferred from New Haven, Conn., to the U.S. National Museum at Washington. Such material as may be necessary will be used for study and illustration in the completion of the monographs that were in course of preparation by Prof. Marsh at the time of his death. The actual number of specimens represented in this collection cannot yet be stated. They range in size from minute teeth of fossil mammals to individual specimens weighing from 500 to 2000 pounds each. The collections are rich in large Dinosauria, especially in examples of *Triceratops* and *Stegosaurus*, while the series of Titanotherium skulls is one of the best, if not the best, in existence. It contains fifty or more complete examples cleaned, and a number in the rough, besides many hundreds of bones. Among the specimens transferred are the types of forty or more species, including Dinosaurs, and Jurassic, Cretaceous and Tertiary mammals. The value of the entire collection is estimated at over 150,000 dollars. Referring to the transference, Prof. S. P. Langley remarks that the addition of this immense collection of most important American fossil remains to the treasures already assembled in the National Museum will afford the greatest satisfaction to all workers in the field of palæontology both at home and abroad.

AN account of certain preliminary experiments conducted with the view of establishing communication by wireless telegraphy between Chamounix and the summit of Mont Blanc has been detailed before the French Physical Society by MM. Léon and Louis Lecarme, and is summarised in No. 140 of the *Bulletin* of the Society. The experiments were conducted last August. The chief difficulties from the point of view of the propagation of Hertzian waves were : (1) the difference of altitude of 3450 metres between the two stations, with a consequent considerable difference of potential between the two masts ; (2) the influence of cloud layers more than 200 metres thick in bad weather, these clouds often consisting of snow in a dense state

of condensation ; (3) the intense electric phenomena which frequently occur at high altitudes ; (4) the two earthed wires whose extremities in this case could not be regarded as at a common zero potential owing to the thick coating of ice and hard snow covering the upper part of the mountain, whose high resistance might cause a considerable difference of potential between the "earth" of the summit and of Chamounix. The transmitting apparatus at Chamounix consisted of a coil giving an 18 cm. spark and a Hertzian oscillator, the balls were 2 cm. apart for giving the best results. The manipulator sent the current from a dynamo of 50 volts through the primary of the coil, and an "antenna" 25 metres long concentrated the waves. The receiver, situated at the Vallot observatory 4350 metres in altitude, was 12 kilometres distant as the crow flies, and consisted of a Branly radioconductor. The experiments were carried on for six days, and gave satisfactory results, but the three-phase currents employed in the electric lighting installation at Chamounix entirely stopped all communication. MM. Lecarme, however, propose to make use of these currents in future experiments.

ATTENTION has already been called in these columns to the system of electrical and magnetic units advocated by Dr. Franz Kerntler in his paper "Die Unität des absoluten Maass Systems. . ." (Budapest, 1899). An account of the Kerntler system is now given by Prof. Rinaldo Ferrini, who, writing in the *Rendiconti del R. Istituto Lombardo*, expresses himself as distinctly in its favour.

THE established system of electrical units has been subjected to analysis and criticism by Prof. J. A. Fleming, F.R.S., in recent issues of the *Electrician*, and the concluding article of the series appears in the current number. Prof. Fleming does not definitely advocate any particular system, but he gives the outlines of a scheme of units which merits consideration both from theoretical and practical points of view. In conclusion, he remarks : "Those who have experience in teaching will agree that a clear view of the fundamental facts and statements is essential if the student is to make any satisfactory progress in handling advanced problems and ideas. In the class-room, no less than in the workshop, every one concerned with electromagnetic phenomena needs exact conceptions and not confused ideas of first principles. Experience shows that our present system of unitation and our existing terminology in describing electric and magnetic effects are not well adapted to facilitate this clearness. We may then ask : Should not the entrance into the twentieth century be inaugurated by some attempt to organise, simplify, and render more symmetrical the language and symbols in which are described the phenomena of electricity and magnetism, with the object of making calculation more easy and thought more precise ?"

THE Pilot chart of the North Atlantic Ocean, issued by the Hydrographic Office of Washington, for January contains, in addition to the usual useful information, a sub-chart showing the average tracks of 121 January storms over the North Atlantic during the ten-year period of 1889-98. The chart shows that the region of maximum storm frequency for that month lies to the north of the steamship routes, in a belt extending north-eastward from Nova Scotia and Newfoundland across the Atlantic. Some of these storms are the most severe, the largest in area and the longest in duration, and may be traced entirely across the ocean, while others disappear to the northward. The storms are divided into nine classes, according to the regions in which they first appeared.

THE Central Meteorological Observatory of Moncalieri has published Vol. II. of the *Annuario storico* for the year 1900 (398 pages). The work contains a large amount of useful information,

including articles and memoirs on various interesting subjects by Italian men of science, and notices of several prominent Italian meteorologists. The work also includes valuable bibliographical notices (1) of recent publications and of articles which have appeared in scientific periodicals both in Italy and other countries; and (2) references to the works of several deceased Italian meteorologists.

BRITISH agriculturists are slowly waking up to the advantages of scientific methods of dealing with diseases of crops. Dr. J. A. Voelcker, consulting chemist to the Royal Agricultural Society, reports in the *Journal* of the Society that the use of "blue vitriol" (sulphate of copper) for agricultural purposes has been considerably extended of late. It has long been employed, either alone or in different preparations of which it formed a constituent part, as a dressing for seed wheat. But of later years the spraying of the potato crop with "Bouillie Bordelaise" mixture, to guard against potato disease, has become more general; and quite lately a further employment of sulphate of copper has been brought to the front in the spraying of corn and other crops infested with charlock, a solution of this salt being used, apparently with good result, for the purpose. Dr. Voelcker has found that the sulphate of copper supplied to farmers is frequently adulterated with sulphate of iron. He points out that the two things do not serve the same purposes agriculturally; for, while sulphate of copper has undoubtedly great value for grain-dressing preparatory to sowing, potato spraying, and charlock destruction, sulphate of iron is practically useless.

Two papers on the purification of waste in water from manufacturing factories were read before the Institution of Civil Engineers on January 9. One of the authors, Mr. R. A. Tatton, gave a detailed description of the works at three manufacturing works where the trade waste is efficiently treated. In one of these, where the process of ordinary bleaching, dyeing and finishing is carried on, the works for purifying the trade waste consists of precipitation-tanks and filters, sludge-tanks, presses, &c. The volume of water at times amounts to 500,000 gallons per day; it is treated with lime and "iron alum" and settled in tanks in which most of the suspended solids are intercepted; from these tanks the water is pumped to a second series of tanks for further precipitation, and the clear liquor is finally passed through cinder filters to the stream. In the works of a large firm of woollen manufacturers, dyers and finishers, the trade waste is pumped into a series of three tanks, in which the solids are precipitated by lime and ferric chloride, the clear liquor passing forward through a second series of tanks and filters into the stream; the sludge is discharged on to filters composed of cocoanut matting, and after it has dried sufficiently, it is pressed and the oil extracted. The dye-water from the mill, to which is added the clear liquor from the grease tanks when they are being drawn off for cleaning, is settled in a series of tanks and filtered. The volume of water dealt with is 180,000 gallons per day. In another firm, carrying on the processes of calico printing, dyeing and bleaching, the pollution is caused by alizarine, logwood and other dyes, soap, starch, &c. The total volume of the trade waste amounts to about 70,000 gallons per day; the water from the various departments is collected to a well, whence it is pumped to the purification works, which consist of a central settling-tank and two precipitation-tanks used alternately; iron alum is used as precipitant. The sludge is drawn from the settling and precipitation-tanks into a well and is thence pumped to a sludge-drying area. The water from the precipitation-tanks is finally filtered through fine ashes.

THE mineral resources of Vancouver and adjacent islands, British Columbia, are dealt with by Mr. W. M. Brewer (*Trans. Inst. Mining Eng.*, 1899). Gold, iron-ore (magnetite) and

coal are chiefly referred to. The author considers that the possibilities of Vancouver Island as a mineral-producing region are very promising. The climate is temperate, and there are numerous deep-water harbours. There is, however, at present a lack of waggon-roads and good trails from the coast to the interior.

THE mineral wealth of Zoutpansberg forms the subject of an article by Mr. Douglas S.-S. Steuart (*Trans. Inst. Mining Eng.*, 1899). The district of Zoutpansberg (Salt-pan Mountain) lies in the northern part of the Transvaal, and comprises about 25,000 square miles, of which proclaimed gold-fields cover 3500 square miles. The author now gives special attention to the gold-bearing reefs in the strata of the Murchison range; these extend seventy miles, and have an average width of four miles. The oldest rocks, known as the Letaba and Murchison range schists, are considered to be of pre-Cambrian age. The series has been tilted into an almost vertical position, and it includes various schists and quartzites, granites and gneisses, which are penetrated by dykes of basic igneous rock. Numerous richly auriferous veins occur among the schists. Auriferous blanket, yielding 5 to 15 dwts. per ton, occurs at the base of the Drakensberg series—a group of sandstones, quartzites and conglomerates, which rest unconformably on the older rocks. The paper is illustrated by map, sections and pictorial views.

THE *Zeitschrift der Gesellschaft für Kunde zu Berlin* contains a paper on the desert of Atacama, by L. Darapsky, with a new map of the region. The main features of the topography are described and illustrated by photographs, and some analyses of the waters of thermal springs and salt marshes are given.

IN the new number of *Spelunca*, M. E. A. Martel gives a summary of the results of recent observations on the movements of water under glacier ice. The paper consists for the most part of a correspondence between the author and Prof. Forel, especially concerning experiments in tracing the movements of underground waters by coloration with fluorescein.

BEGINNING with the number for the last week of November, *Die Natur* publishes a series of articles on the Antarctic regions and Antarctic voyages, translated from a paper by Axel Ohlen in *Ymer*, by A. Lorenzen. The detailed account given of the history of Antarctic discovery is of special interest at the present time.

PROF. W. M. DAVIS, of Harvard University, contributes a valuable note on "A Fault Cliff in the Lepini Mountains" to the December *Bollettino della Societa Geografica Italiana*, illustrated by a number of excellent photographs. The note is translated by Fr. M. Pisanisi, who adds some bibliographical paragraphs, and expresses the hope that the study of geomorphology may receive more attention from Italian geographers.

BESIDES the usual meteorological notes, the new number of the *Mitteilungen von Forschungsreisenden und Gelehrten aus den deutschen Schutzgebieten* contains an interesting paper on the native methods of extracting and manufacturing iron in Togoland. Diagrams of different forms of furnace are given, and a vocabulary of technical terms in various dialects.

THE publication of the scientific results of the Norwegian North Polar expedition (1893-1896), edited by Dr. Nansen, will be commenced almost immediately by Messrs. Longmans, Green and Co. The whole work is estimated to form five six quarto volumes, which it is hoped will be completed in the course of about two years; it will be issued in the English language only.

AN Earthquake Investigation Committee was instituted by the Japanese Government in 1893, for the collection of facts relating to earthquakes in Japan. The work was at first superintended by the late Prof. S. Sekiya, and, since his death, in January 1895, has been carried on by Mr. M. Tayama. It is now approaching completion, and, in the meantime, Prof. Omori has issued a catalogue which will serve as an index to the future report of the Committee (*Journal of the College of Science, Imperial University, Tokio*, vol. xi. Part 4). This has been compiled from 427 different kinds of Japanese histories and chronicles, and gives the dates, districts and intensities of 1898 earthquakes between the years 416 and 1867. The catalogue is followed by a most valuable discussion of its contents by Prof. Omori, in which he considers the distribution of the earthquakes in time and space. The total number of destructive earthquakes is 220, but, as the early annals are incomplete, it seems likely that one part or other of Japan will be visited by a destructive earthquake once in about two-and-a-half years. While they sometimes happen singly, they tend to recur in groups during epochs of maximum frequency, which happen on an average once in every thirteen or fourteen years. If the shocks are counted during consecutive half-centuries, the destructive and the small shocks have their maxima and minima at nearly the same epochs. But when examined in detail this is not the case. For instance, destructive shocks are most numerous during the months of July and August, while the ordinary shocks are least frequent at about the same time. The explanation which Prof. Omori suggests for this reversal is that the constant recurrence of small earthquakes maintains the region concerned in a normal or safe condition, thereby preventing any abnormal accumulation of stress in the earth's crust. Again, dividing the destructive earthquakes into local and non-local, according as the damage caused by them was confined to one province or distributed over several, it appears that the provinces on the concave or Japan Sea side of the group of islands were disturbed almost wholly by local shocks, while those on the convex or Pacific side were often disturbed by great non-local ones, the origins of which were situated beneath the ocean, and sometimes caused fearful sea-waves.

MINUTE, neatly worked flint implements have recently been found in great numbers in East Lancashire and South Yorkshire. Mr. R. A. Gatty describes in *The Reliquary and Illustrated Archaeologist* (vol. vi., 1900, p. 15) how he has found many hundreds of these "Pigmy flint implements," as he terms them. Others have been found in various parts of England, but not so abundantly as in Yorkshire; but that may be owing to their having been overlooked. They appear to be always associated with rough Neolithic implements, but there was a total absence of polished implements. Mr. Gatty figures some of these interesting objects, and places side by side figures of "pigmy flints" from Indian caves and from the surface of the ground at Hoxton Roberts (Yorks.); the forms are apparently identical. Similar tools have been met with in France and Belgium.

TWO Neolithic graves in the neighbourhood of Worms are figured in *Die Umschau* (Tom. iii., p. 1023). In the man's grave were found stone implements and pottery, the latter is also figured; and in the woman's grave was a food-pounder.

HERR E. LEMMERMANN reprints, from the *Proceedings of the Natural History Society of Bremen*, an account of the Plankton algae (including Peridiniæ) collected in Prof. Schaudinn's expedition to the Pacific in 1896-1897. The general features of the Plankton flora of the Pacific Ocean are discussed, and four new genera of Schizophyceæ are described—*Coelosphaeriopsis*, *Chondrocystis*, *Haliarachne*, and *Katagnymene*—as well as a number of new species and forms.

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MR. M. A. CARLETON publishes, in the form of a report to the U.S. Department of Agriculture (Division of Vegetable Physiology and Pathology, *Bulletin* No. 16), an exhaustive paper on the Cereal Rusts of the United States. He finds six, or probably seven, distinct rusts affecting the cereal crops, of which by far the most destructive are the "black stem rusts" of wheat and oats, *Puccinia graminis Tritici* and *P. graminis Avenae*. The injury to the crops by these fungi is on an enormous scale. The report goes into details respecting the varieties of the cereals best able to resist the parasites, and the best means of warding off their attacks. It is illustrated by several very well executed coloured plates.

WITH the exception of two papers by Dr. O. Finsch on birds, the latest issue of the *Notes from the Leyden Museum* is devoted to invertebrates. Perhaps the most generally interesting contribution is one by Dr. J. G. de Man on the crabs collected by the Dutch Scientific Expedition to Central Borneo; the materials obtained showing, as in the case of the crayfish previously described, how extremely imperfect was our knowledge of the carcinological fauna of the country. Out of a total of fifteen species collected, of which all but one were land or fresh-water forms, no less than eleven or twelve proved to be new to science. And whereas only three fresh-water crabs were previously known to inhabit the island of Borneo, the number is now raised to fifteen. Very noticeable is the discovery of a crab belonging to the genus *Menippe*, closely allied to the rare *M. panope* from Tranquebar; since, with the possible exception of the last-named, all the species of that genus hitherto known, as well as those belonging to the allied *Myomenippe*, are marine forms.

MANY interesting and instructive articles on diverse scientific subjects are contained in the volume of *Knowledge* for 1899, a copy of which has been received. The fine collotype illustrations distributed through the volume form an attractive characteristic of this monthly magazine of science.

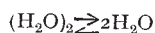
THE fourteenth volume of the new series of *The Geographical Journal*, containing the numbers from July to December 1899, has just been published. The papers, articles, monthly bibliography, and numerous maps, combine to make the volume, like preceding ones, a valuable record of the progress of the knowledge of the earth.

THE genus *Cardium*, of which the edible cockle is by far the commonest member, forms the second number of the memoirs of the Liverpool Marine Biology Committee, the author being Mr. J. Johnstone. A detailed account is given of the anatomy of the cockle as a typical Lamellibranchiate Mollusc, and the economic importance of the cockle, with special reference to the Lancashire Sea-Fisheries district, is described in an appendix. Seven plates illustrate the points dealt with in the memoir.

THE "Annuaire" of the Bureau des Longitudes, for 1900, has been received from Messrs. Gauthier-Villars, Paris. It is noteworthy that all the dates are expressed in Paris Mean Civil Time, commencing at midnight and reckoning from 0 to 24 hours, instead of dividing the day into two parts of twelve hours each as heretofore. As usual, the volume is filled with information of interest and value to all observers of the heavens, and also to other students of science, for the tables of constants contained in it cover a wide range of scientific work. The subjects of the special articles are machines for generating electric currents, by Prof. Cornu; the new gases in the atmosphere, by Prof. Lippmann; and work done at the Mont Blanc Observatory, by Dr. Janssen, who also writes on the application of aeronautics to the observation of certain astronomical phenomena.

THOUGH articles of scientific interest only occasionally appear in British monthly periodicals read by the general public, they are more frequent in the American magazines published here. The *Monthly Guide to Periodical Literature*, the first number of which has just been issued by the Advertising Agency of London, is therefore not without value from the scientific side; for it shows the titles and writers of articles in the chief magazines and reviews which reach us from the United States, and also in similar periodicals having their origin on this side of the Atlantic. Assuming that the editors of the various popular magazines know the pabulum best appreciated by their readers, an examination of the list of articles shows that science is given but scant attention by the reading public. A few editors with scientific knowledge as well as literary capacity might do much to increase interest in natural knowledge, and raise their readers' minds above the dead level of indifferent fiction and sensational science.

THE *Zeitschrift für physikalische Chemie* contains a very ingenious application by J. J. van Laar of thermodynamics to the results of Ramsay and Shields upon the association of liquids. Assuming that θ simple molecules of water are associated to form a compound molecule, Dr. van Laar applies the thermodynamical conditions of equilibrium to the rate of change of the constant of association with temperature, and applies the resulting formula to the experimental figures of Ramsay and Shields. The value of q , the heat of dissociation of the molecule $[\text{H}_2\text{O}]^\theta$ thus determined, should be constant if the right value of θ is assumed, and this is the case for water at temperatures between 0°C . and 60°C . if $\theta=2$. The results are not so good if θ be taken as 3 or 4, and hence the author concludes that the association is correctly expressed by



with an absorption of 1930 calories per 18 grams of water. Ethyl alcohol also appears to be bimolecular, but for methyl alcohol and acetic acid $\theta=3$ at least. The contraction ensuing when alcohol and water are mixed and the phenomenon of the maximum density of water are also considered from this point of view, with the striking result that the assumption of the partial association of liquid molecules explains, not only the contraction on mixing with alcohol, but also the irregular expansion of water.

THE additions to the Zoological Society's Gardens during the past week include a White-throated Capuchin (*Cebus hypoleucus*) from Central America, presented by Mrs. Vernon; a Blue and Yellow Macaw (*Ara ararauna*) from South America, presented by Mr. H. W. Stride; two Java Sparrows (*Padda oryzivora*) from Java, presented by Mr. Walter Buchanan; an Indian Dial-Bird (*Copsychus saularis*) from India, presented by Mr. W. H. St. Quintin; a Delalande's Gecko (*Tarentola delalandii*) from West Africa, presented by Mr. May; two Spotted Salamanders (*Salamandra maculosa*), European, presented by Mrs. Brett; a Hocheur Monkey (*Cercopithecus nictitans*) from West Africa, a Vulpine Phalanger (*Trichosaurus vulpecula*) from Australia, ten Nose-crested Iguanas (*Iguana tuberculata rhinolophus*) from Nicaragua, two Whooper Swans (*Cygnus musicus*), European; a Starred Tortoise (*Testudo elegans*) from India, deposited.

OUR ASTRONOMICAL COLUMN.

NEW MINOR PLANET (1899 E.Y.).—Herr Otto Knopf, of the Jena Observatory, gives the elements and ephemeris of this planet in *Astronomische Nachrichten*, Bd. 151, No. 3612, from which the following abridgment is obtained:—

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Elements for Epoch 1900 January 0.0 Berlin Mean Time.

$$\begin{aligned} M &= 345^\circ 32' 15.3'' \\ \omega &= 3^\circ 32' 19.9'' \\ \Omega &= 89^\circ 46' 43.3'' \\ i &= 15^\circ 22' 20.0'' \\ \phi &= 5^\circ 13' 16.4'' \\ \mu &= 651'' \cdot 293 \\ \log a &= 0.490821 \end{aligned} \quad 1900.$$

Ephemeris for 12h. Berlin Mean Time.

| 1899. | | R.A. | | Decl. |
|---------|-----|----------|-----|-------------|
| | | h. m. s. | | |
| Jan. 18 | ... | 4 9 34 | ... | +17° 32' 5" |
| 22 | ... | 9 22 | ... | 17 54.2 |
| 26 | ... | 9 36 | ... | 18 16.4 |
| 30 | ... | 10 15 | ... | 18 38.9 |
| Feb. 3 | ... | 11 19 | ... | 19 1.9 |
| 7 | ... | 4 12 46 | ... | +19 25.0 |

SCIENCE TEACHERS IN CONFERENCE.

THE Committee responsible for the arrangements in connection with the English Education Exhibition, which is now being held at the Imperial Institute, very wisely decided that a series of conferences, lectures and demonstration lessons arranged by the chief educational bodies throughout the country would form a valuable adjunct to their exhibition. The invitations which the Committee sent out met with a very cordial reception, and the programme of meetings for the discussion of educational questions includes nearly every grade and phase of English school life.

One of the most interesting of these events was a conference of science teachers from all parts of the country, arranged by the Technical Education Board of the London County Council. The success which attended similar gatherings during January 1899 convinced the promoters that nothing but good resulted from the discussion of methods of teaching different branches of science, and the meetings on January 10 and 11 were arranged in much the same way as those of the first conference last year. But whereas the subjects considered in 1899 were various branches of physics and chemistry, the greatest prominence was this year given to plans of instruction in natural history and manual training.

THE TEACHING OF BOTANY.

At the first meeting held on the morning of January 10 at the Imperial Institute, when the methods of teaching botany was the subject dealt with, the chair was taken by Sir John Lubbock. Papers were read by Prof. Miall, F.R.S., of the Yorkshire College, Leeds, and Miss von Wyss, of the North London Collegiate School for Girls.

Prof. Miall gave it as his opinion that the teaching of botany in schools is not spreading, though there is hardly any scientific inquiry which is at once so practicable and inviting. A special reason for encouraging the study of botany is that a knowledge of the great facts of plant-life is essential to scientific agriculture. Those who live by agriculture, which is still our greatest industry, are already beginning to demand that, in our rural schools at least, the scientific basis of agriculture shall somehow enter into the course of instruction. A school course may conveniently be divided into three stages according as the pupils are children (age 8–12), boys and girls (13–16), or young men and women (17–19). The science lessons given in the first stage should take the form of object lessons. In the second stage systematic science may be begun, and here chemistry and physics will be the common choice, but natural history should be kept alive by school natural history clubs and rambles. In the third stage, students who will follow some pursuit in which natural history plays a part, should take up natural history again and study it methodically in the light of their chemistry and physics.

In the first stage the following maxims were recommended by Prof. Miall. (1) No technical terms in Latin and Greek. (2) No lectures or information lessons. (3) No books in class. (4) Let all lessons be interrogations of actual objects, and largely of live plants. (5) Try to make the class active and